The managers are PC-based software belonging to the Nokia product range of node managers. All managers feature an easy-to-use user interface and commissioning wizard that guides the user through the commissioning tasks. The managers can access the radio locally via the local management port or they can access the radio remotely via the embedded Nokia Q1 bus.
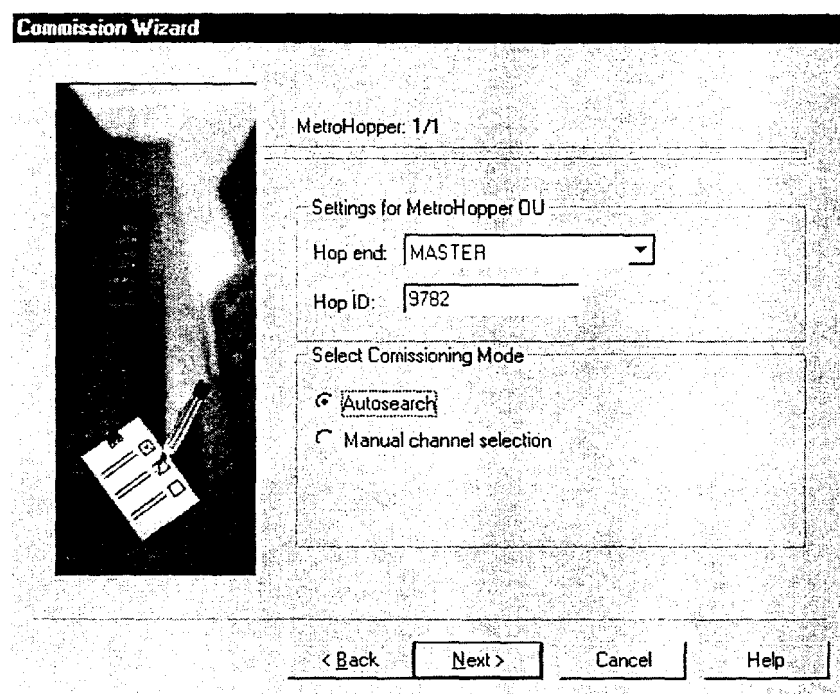


**Figure 8**     Example of a commissioning wizard window

The managers are used when:

- commissioning new radios
- changing the configuration of a new or previously configured radio
- creating 2 Mbit/s cross-connections
- troubleshooting a radio
- monitoring the fault status of a radio
- monitoring signal quality
- re-initiating channel selection procedure
- downloading new software.

The managers run on a PC-compatible computer under Microsoft Windows 95 or Microsoft Windows NT 4.0.

The managers can be used both online and offline. When used online, information is read directly from the radio and interpreted by the manager. This information can then be easily changed and sent back to the radio. When the manager is used offline, settings files can be created in the office and downloaded to the node at the site.

# Chapter 6
# Mechanical structure

Nokia MetroHopper consists of an indoor unit and an outdoor unit. The units are connected together with a single coaxial cable, referred to as Flexbus.

## 6.1   Outdoor unit

Nokia MetroHopper radio consists of an outdoor unit and an alignment bracket. The flat panel antenna is integrated to the outdoor unit. The OU weighs less than 4 kg. The alignment bracket of Nokia MetroHopper is suitable for mounting on an installation pole, a wall, or a roof.
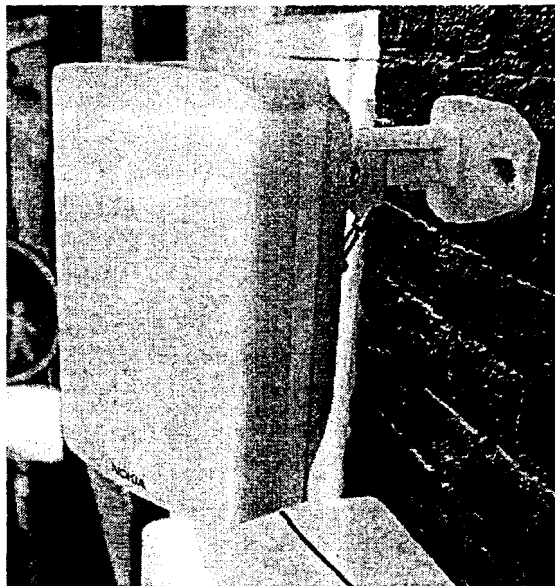


Figure 9    Nokia MetroHopper outdoor unit (OU)

The rectangular appearance of the OU is designed to blend in with the surrounding environment and to avoid attracting any extra attention at the street-level in metropolitan area.

The OU is connected to the indoor unit (IU) with a Flexbus cable. The OU has also a connector for AGC voltage measurement, and a connector for the synchronisation cable.

The power consumption of the OU is < 13 W. The power is fed to the OU by the Flexbus cable from the IU.

## 6.2 Indoor units

Nokia supplies four different indoor units for Nokia MetroHopper to provide optimal features for different environments. The main features of each indoor unit are described below.

The capacity of Nokia MetroHopper is always 4 x 2 Mbit/s. The same indoor units can also be used with Nokia FlexiHopper providing up to 16 x 2 Mbit/s capacity.

### FIU 19 – 19″ indoor unit

The FIU 19 indoor unit is designed for applications where all available slots for the RRI radio indoor unit family have been already used and for multivendor environments. FIU 19 can be installed horizontally into a 19″ rack or vertically in a TM4 rack. The main unit of FIU 19 is only 2/3 U (29 mm) high. One FIU 19 can support one to three outdoor units.
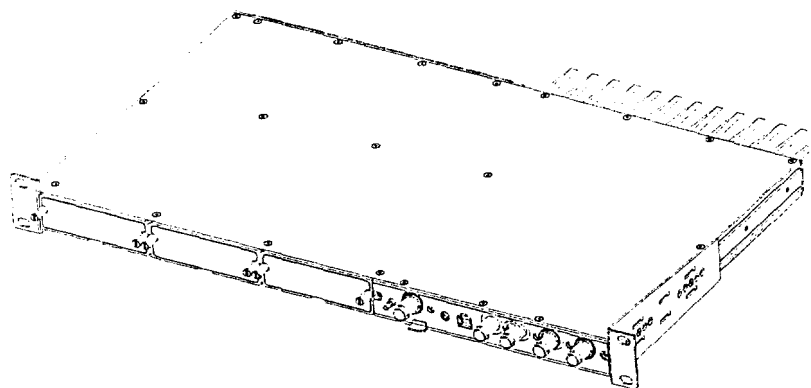


**Figure 10**     FIU 19 main unit

The radio capacity of the unit can be selected with Nokia Hopper Manager or Nokia NMS Network Management System. The interface capacity can be expanded from 4 x 2 Mbit/s up to 12 x 2 Mbit/s easily with plug-in units. The use of full 16 x 2 Mbit/s interface capacity requires an expansion unit that is of same size as the main unit. With Nokia MetroHopper the capacity is fixed to 4 x 2 Mbit/s. A 2 Mbit/s cross-connect is fully integrated into FIU 19.

     NTC C33512003SE_C0

### RRIC – radio indoor unit for Talk-family base stations

The RRIC indoor unit is a plug-in unit that is integrated directly into Nokia Citytalk and Nokia Intratalk base stations. RRIC offers from 2 x 2 Mbit/s up to 16 x 2 Mbit/s radio capacity and up to 4 x 2 Mbit/s add/drop capacity to the base station transmission unit
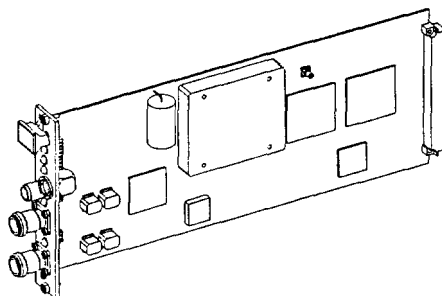


**Figure 11      RRIC**

RRIC has two Flexbus interfaces on the front panel and a third interface on the backplane, towards the BTS. In addition, RRIC has connectors for local management and a measurement point.

### FC RRI – Nokia MetroSite Base Station radio indoor unit

FC RRI is a radio indoor unit that can be installed in Nokia MetroSite Base Station to provide a minimum-cost solution for Nokia MetroSite. This unit has one Flexbus interface on the front panel. FC RRI is managed via the local management port in Nokia MetroSite BTS.
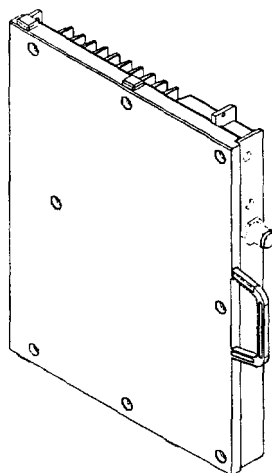


**Figure 12     FC RRI**

### FXC RRI – Nokia MetroSite Base Station and Nokia MetroHub radio indoor unit

FXC RRI is a radio indoor unit that can be installed in Nokia MetroSite Base Station and Nokia MetroHub. FXC RRI enables connection for two outdoor units, supports loop protection, and provides grooming with 8 kbit/s granularity.

Unlike FC RRI, FXC RRI has two Flexbus interfaces on the front panel. FXC RRI is managed via the local management port in Nokia MetroSite Base Station or Nokia MetroHub.
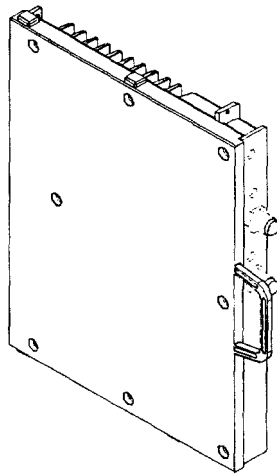


**Figure 13**     FXC RRI

NTC C33512003SE_C0

# Chapter 7
# Nokia MetroHopper products

The following table lists the products belonging to Nokia MetroHopper.

| Nokia MetroHopper products |
| --- |
| Outdoor unit (including the alignment bracket) |
| Indoor units<br>      FC RRI           Nokia MetroSite Base Station integrated<br>      FXC RRI         Nokia MetroSite Base Station or Nokia MetroHub integrated<br>      FIU 19          19″ or TM4 mechanics installation<br>      RRIC           Nokia Intratalk and Nokia Citytalk integrated<br>(Indoor units contain only digital baseband parts and therefore do not require type approval.) |
| Flexbus cable |
| Synchronisation cable |
| Optical alignment tool |
| Nokia Hopper Manager, Nokia MetroSite Manager |
| Customer documents<br>      Nokia MetroHopper Product Overview<br>      Nokia MetroHopper with FIU 19/RRIC User Manual<br>      Nokia MetroHopper with FC RRI/FXC RRI User Manual |

# Chapter 8
# Technical specifications

## 8.1    General

### Operation

| Operation | |
|---|---|
| Capacity | 4 x 2 Mbit/s (ITU-T G.703, ITU-T G.704) |
| Operating modes | Single use<br>1 indoor unit / 2 outdoor units (not with FC RRI)<br>Loop protection |
| Statistics | ITU-T G.826 |
| Jitter | ITU-T G.823 |
| AIS | ITU-T G.921 |
| Cross-connection level<br>FC RRI<br>FXC RRI<br>FIU 19<br>RRIC | <br>2 Mbit/s<br>8 kbit/s<br>2 Mbit/s<br>2 Mbit/s (8 kbit/s with TRUx) |
| RBER | $\leq 10^{-11}$ |
| Transmission delay, zero length RF path<br>interleaving depth 4<br>interleaving depth 0 | <br>< 500 µs<br>< 370 µs |

# Environment

| EMC | | |
|---|---|---|
| ETS 300 385, EMC standard for digital fixed radiolinks and ancillary equipment | | |
| Emissions | Radiated emission | EN 55022 Class B |
| | Conducted emission | EN 55022<br>0.15 - 0.5 MHz: 66 dBμV, average<br>0.5 - 30 MHz: 60 dBμV, average |
| Immunities | RF EM field | ENV 50140<br>80 - 1000 MHz, 3 V/m: no errors |
| | Electrostatic discharge | EN 60801-2<br>±8 kV air discharge: no errors<br>±4 kV contact discharge: no errors |
| | Fast common mode transients | IEC 801-4<br>1 kV: no errors |
| | RF common mode | ENV 50141<br>0.15 - 80 MHz, 3 $V_{RMS}$: no errors |
| | Surges | ENV 50142<br>1 kV, 10 Ω series resistance:<br>no damage, self recovery |
| | Overvoltage tolerance of the indoor-outdoor cables and outdoor unit power input | 4 kV, 88 μs rise time, 20 μs fall time<br>(to half voltage) |

| Temperature, humidity, wind | |
|---|---|
| All units, storage and transportation | |
| Temperature | –40 to +70° C |
| Relative humidity | 10 - 100% (storage)<br>< 95% (transport) |
| Outdoor unit, operation | |
| Temperature range (in shade) | –45 to +50° C (operational)<br>–40 to +50° C (start–up) |
| Relative humidity | ≤ 100% |
| Wind | < 50 m/s |
| FC RRI and FXC RRI indoor units, operation | |
| Temperature range | –40 to +50° C |
| Relative humidity | ≤ 100% |
| FIU 19 and RRIC indoor units, operation | |
| Temperature range | –10 to +50° C |
| Relative humidity | < 95% |

 NTC C33512003SE_C0

## 8.2    Nokia MetroHopper outdoor unit

### Frequencies

| Frequency and duplexing | |
|---|---|
| Frequency range | 57.200 - 58.200 GHz |
| Nominal channel spacing | 100 MHz (ETS 300 408) |
| Duplexing method | Time division duplex |
| Channel selection | Automatic / Manual |
| Tx frequency stability | < ± 20 ppm |

### Modulation and demodulation

| Modulation and demodulation | |
|---|---|
| Modulation method | MSK |
| Demodulation method | Doubly differential detection |
| Spectrum mask | ETS 300 408 fig.3 |

| Co-channel interference (similar interferer), signal to inteference ratio | |
|---|---|
| Threshold degradation 1 dB | < 18 dB (BER = $10^{-3}$) |
| | < 20 dB (BER = $10^{-6}$) |
| Threshold degradation 3 dB | < 15 dB (BER = $10^{-3}$) |
| | < 17 dB (BER = $10^{-6}$) |

| Adjacent channel interference (similar interferer, offset 100 MHz), signal to interference ratio | |
|---|---|
| Threshold degradation 1 dB | < –42 dB (BER = $10^{-3}$) |
| | < –40 dB (BER = $10^{-6}$) |
| Threshold degradation 3 dB | < –47 dB (BER = $10^{-3}$) |
| | < –45 dB (BER = $10^{-6}$) |

| Receiver bandwidth | |
|---|---|
| Receiver –3 dB bandwidth (nominal) | 23 MHz |
| Receiver noise bandwidth (nominal) | 26 MHz |

## Power levels

| Power levels | |
|---|---|
| Tx power (typical) | 5 dBm |
| Rx noise figure | < 19 dB |
| Maximum received power level | −20 dBm (BER = $10^{-3}$) |
| | −22 dBm (BER = $10^{-6}$) |

| Spurious outputs | |
|---|---|
| Spurious outputs at antenna connector outside the nominal centre frequency ±45 MHz (ETS 300 408) | |
| 0.07 - 21.2 GHz | < −60 dBm |
| 21.2 - 80 GHz | < −30 dBm |
| 80 - 120 GHz | < −20 dBm |

| Receiver BER thresholds | |
|---|---|
| BER $10^{-3}$ | |
| typical | < −71 dBm |
| guaranteed | < −69 dBm |
| BER $10^{-6}$ | |
| typical | < −69 dBm |
| guaranteed | < −67 dBm |
| Rx signal level measurement accuracy | < ±5 dB |

## Interfaces

| Flexbus interface | |
|---|---|
| Connector type | TNC 50 Ω female |
| Supply voltage | 48 - 60 $V_{DC}$ |

| Synchronisation interface | |
|---|---|
| Connector type | TNC 50 Ω female |

| AGC monitor interface | |
|---|---|
| AGC output connector | BNC |
| Voltage range (decreasing with increasing Rx level) | 0.5 - 4.5 V |
| Output impedance | 33 kΩ |

 NTC C33512003SE_C0

## Power supply, dimensions, installation options

| Nokia MetroHopper outdoor unit | |
|---|---|
| **Power supply and power consumption** | |
| DC supply voltage (supplied by the IU) | 48 – 60 V |
| Power consumption | < 13 W |
| **Dimensions** | |
| Outdoor unit | Height 255 mm<br>Width 190 mm<br>Depth 102 mm<br><br>Weight 2.9 kg |
| Alignment bracket | Weight 1.3 kg |
| **Installation options** | |
| Installation options | Pole ∅ 30 - 120 mm<br>Wall<br>Roof |

## Antenna

| Antenna adjustment ranges | | |
|---|---|---|
| Antenna type | Integrated flat panel antenna | |
| Polarization | Vertical | |
| Horizontal adjustment | coarse | ±90 ° |
| | fine | ±10 ° |
| Vertical adjustment | coarse | ±90 ° |
| | fine | ±10 ° |

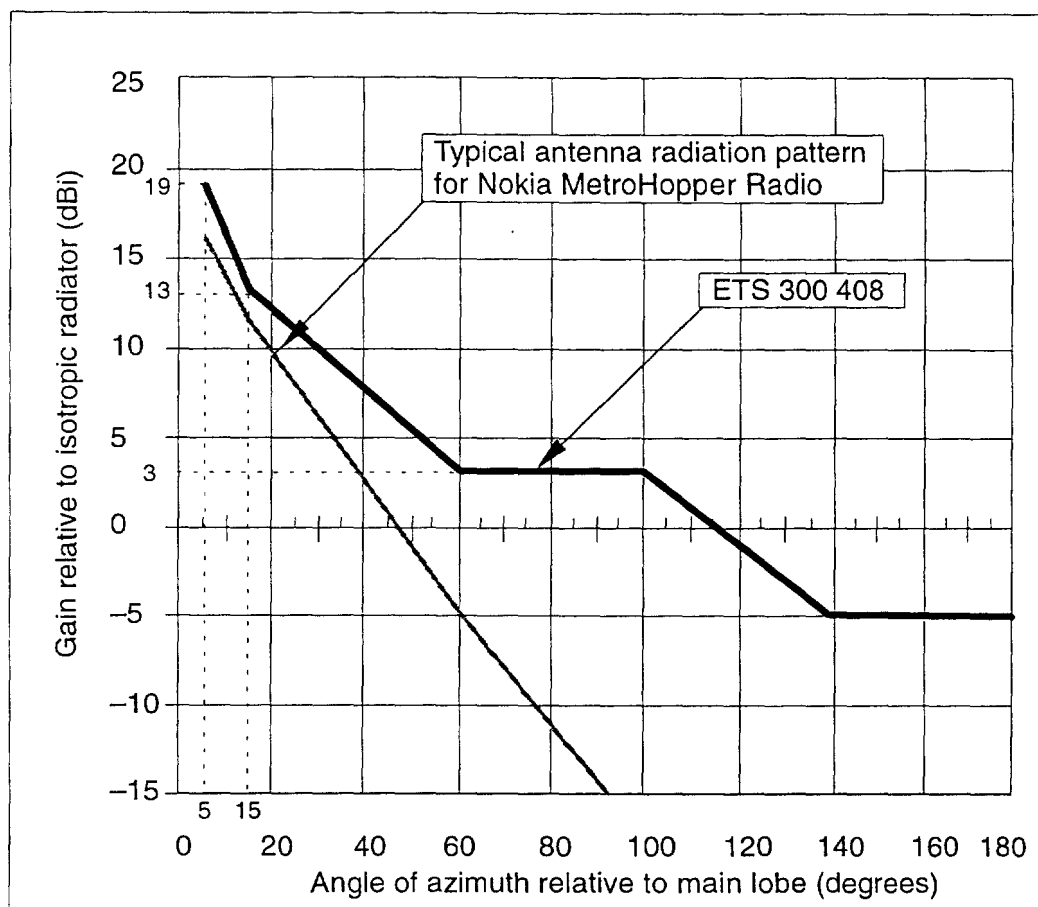| Antenna radiation pattern | |
|---|---|
| Antenna type | Integrated flat panel antenna |
| Antenna gain | 34 dBi |
| 3 dB beam width | 1.5 ° |
| **Antenna radiation pattern ETS 300 408** | |
| 5° | < 19 dBi |
| 15° | < 13 dBi |
| 60° | < 3 dBi |
| 100° | < 3 dBi |
| > 140° | < –5 dBi |

**Figure 14**   Limits of antenna gain for angles greater than 5° from the main beam axis

## 8.3   Flexbus cable

| Flexbus cable requirements | |
|---|---|
| Cable type | Coaxial cable, double shielded or semi-rigid |
| Characteristic impedance | $50 \pm 2 \, \Omega$ |
| DC resistance | $< 4.6 \, \Omega$ (sum of inner and outer conductor) |
| Data attenuation | < 9.0 dB at 19 MHz |
| Flexbus signals | – DC power supply<br>– Bidirectional data (37 Mbit/s, NRZ code, 1.4 V pulse amplitude) |
| NOTE: Over-voltage protection and cable equalizer are integral parts of the Flexbus interface. Primary over-voltage protection is a 90 V gas-arrester. External gas-arresters can be used as well. | |
| Recommended cable type | |
| RG-223 | max. length 140 m |
| RG-214 | max. length 300 m |

## 8.4   FIU 19 indoor unit

### Interfaces

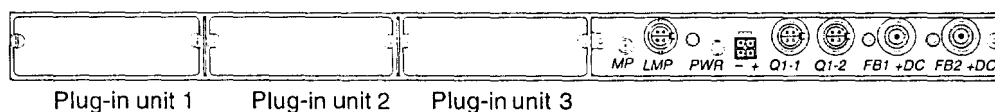| FIU 19 | |
|---|---|
| **Main unit** | |
| Flexbus interfaces 1 and 2<br>FB1, FB2 | TNC connector 50 Ω<br>Up to 16 x 2 Mbit/s signals (4 x 2 Mbit/s with MetroHopper); OU power supply |
| Network management interfaces<br>Q1-1, Q1-2 | TQ connector<br>Max. 9600 bit/s, V.11 |
| Power supply connector<br>PWR | Molex Micro-Fit 3.0 |
| Local management port<br>LMP | BQ connector<br>Max. 115 kbit/s; RS-232 interface |
| Measurement point connector<br>MP | SMB connector, 75 Ω<br>Digital output for 2 Mbit/s signals and internal frequencies |



Plug-in unit 1     Plug-in unit 2     Plug-in unit 3

**Figure 15**     FIU 19 interfaces

| FIU 19 | |
|---|---|
| **4 x 2M plug-in units, 16 x 2M expansion units** | |
| 2M interfaces, n x 2 Mbit/s | SMB connector, 75 Ω<br>or<br>TQ connector, 120 Ω<br>ITU-T G.703 |
| **Flexbus plug-in unit** | |
| Flexbus interfaces 3 and 4<br>FB3, FB4 | TNC connector 50 Ω<br>Up to 16 x 2 Mbit/s signals (4 x 2 Mbit/s with MetroHopper); OU power supply |
| OU power supply input<br>(for the third OU) | Molex Micro-Fit 3.0 |

## Power supply, dimensions, installation options

| FIU 19 | | |
|---|---|---|
| **Power supply and power consumption** | | |
| Main unit power supply | −40.5 to −72 $V_{DC}$ | |
| Flexbus plug-in unit power supply | +52 to +60 $V_{DC}$ | |
| Power consumption (IU only) | < 17 W | |
| Power consumption (IU + 2OU + maximum cable loss) | < 46 W | |
| **Dimensions** | | |
| Dimensions of the main unit and the expansion unit | Height<br>Width<br><br>Depth<br>Weight | 29 mm (2/3 U)<br>444 mm (with 1 U brackets)<br>449 mm (with 1.5 U brackets)<br>300 mm (without connectors)<br>2.45 kg |
| Dimensions of the plug-in units | Height<br>Width<br>Depth<br>Weight | 25 mm<br>75 mm<br>160 mm<br>0.075 - 0.150 kg |
| **Installation options** | | |
| Installation options | 19″ rack<br>TM4 slim rack (with adaptor) | |

 NTC C33512003SE_C0

NOKIA                                                    Technical specifications

## 8.5    RRIC indoor unit

### Interfaces

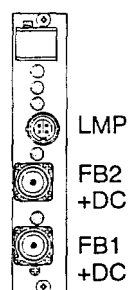| RRIC | |
|---|---|
| **Front panel** | |
| Flexbus interfaces 1 and 2<br>FB1, FB2 | N-connector 50 Ω<br>Up to 16 x 2 Mbit/s signals, OU power supply |
| Local management port<br>LMP | BQ connector<br>Max. 115 kbit/s, RS-232 interface |
| **Other** | |
| Measurement point<br>(on the printed circuit board) | SMB connector, 75 Ω<br>Digital output for 2 Mbit/s signals and internal fre-<br>quencies |
| Flexbus interface 3<br>(via backplane to another RRIC) | Up to 16 x 2 Mbit/s |
| 2M interfaces to TRUx | 4 x 2 Mbit/s |



Figure 16    RRIC  interfaces

### Power supply, dimensions, installation options

| RRIC indoor unit | |
|---|---|
| **Power supply and power consumption** | |
| DC supply voltage | Powered by the BTS |
| Power consumption | < 7 W |
| **Dimensions** | |
| Dimensions | Height 130.8 mm<br>Width 25 mm<br>Depth 280 mm<br>Weight 0.3 kg |
| **Installation options** | |
| Installation options | Integrated into Nokia Citytalk or Nokia Intratalk BTS |

## 8.6 FC RRI indoor unit

### Interfaces

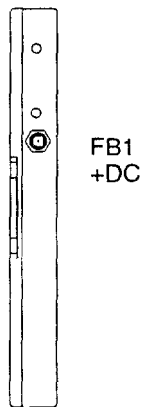| FC RRI indoor unit | |
|---|---|
| Flexbus interface 1 FB1 | TNC connector 50 Ω Up to 16 x 2 Mbit/s signals (4 x 2 Mbit/s with Metro-Hopper); OU power supply |
| Local management port LMP | BQ connector in Nokia MetroSite Base Station |
| 2M interfaces towards BTS | 1 x 2 Mbit/s |



FB1
+DC

**Figure 17**    FC RRI interfaces

### Power supply, dimensions, installation options

| FC RRI indoor unit | |
|---|---|
| **Power supply and power consumption** | |
| DC supply voltage | Powered by the BTS |
| Power consumption | < 7 W |
| **Dimensions** | |
| Dimensions of indoor unit | Height    254 mm Width    28 mm Depth    164 mm Weight    0.65 kg |
| **Installation options** | |
| Installation options | Integrated into Nokia MetroSite Base Station |

NTC C33512003SE_C0

## 8.7   FXC RRI indoor unit

### Interfaces

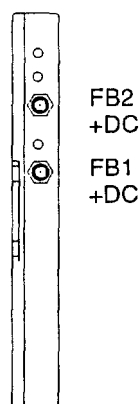| FXC RRI indoor unit | |
|---|---|
| Flexbus interfaces 1 and 2<br>FB1, FB2 | TNC 50 Ω female<br>Up to 16 x 2 Mbit/s signals (4 x 2 Mbit/s with Metro-Hopper); OU power supply |
| Local management port LMP | BQ connector in Nokia MetroSite Base Station or Nokia MetroHub |
| 2M interfaces towards BTS or transmission node | 16 x 2 Mbit/s |



FB2
+DC

FB1
+DC

**Figure 18**     FXC RRI interfaces

### Power supply, dimensions, installation options

| FXC RRI indoor unit | |
|---|---|
| **Power supply and power consumption** | |
| DC supply voltage | Powered by the BTS or transmission node |
| Power consumption | < 8 W |
| **Dimensions** | |
| Dimensions of indoor unit | Height    254 mm<br>Width     28 mm<br>Depth     164 mm<br>Weight    0.7 kg |
| **Installation options** | |
| Installation options | Integrated into Nokia MetroSite Base Station or Nokia MetroHub |

## 8.8 System requirements for Nokia Hopper Manager

The Nokia Hopper Manager software for managing Nokia MetroHopper with FIU 19 has the following hardware and software requirements:

| System requirements | |
| --- | --- |
| Computer | Intel Pentium -based IBM-compatible PC |
| Operating system | Microsoft Windows 95 or<br>Microsoft Windows NT 4.0 Workstation |
| RAM | 16 MB for Microsoft Windows 95<br>32 MB for Microsoft Windows NT |
| Hard disk space | 20 MB for the node manager software |
| Display | Super VGA, minimum resolution 800 x 600 |
| Accessories | CD-ROM drive<br>Microsoft Windows compatible mouse or pointing device<br>Microsoft Windows compatible printer (*optional*)<br>Communication cable (from PC to the node) |

System requirements for the Nokia MetroSite Manager software are specified in *Nokia MetroSite Base Station Product Overview.*

## 8.9   International recommendations

This is a list of the recommendations referred to in technical specifications.

| Signals (ITU-T) | Recommendation name |
|---|---|
| G.703 | Physical/electrical characteristics of hierarchical digital interfaces |
| G.704 | Synchronous frame structures used at primary and secondary hierarchical levels |
| G.823 | The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy |
| G.826 | Error performance parameters and objectives for international, constant bit rate digital paths at or above primary rate |
| G.921 | Digital sections based on the 2048 kbit/s hierarchy |

| Radio transmission (ETSI) | Recommendation name |
|---|---|
| ETS 300 408 fig.3 | Parameters for radio-relay systems for the transmission of digital signals and analogue video signals operating at around 58 GHz which do not require co-ordinated frequency planning. |

| Environment | Recommendation name |
|---|---|
| ETS 300 019-1-1 Class 1.2 | Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Storage. |
| ETS 300 019-1-2 Class 2.3 | Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Transportation. |
| ETS 300 019-1-3 Class 3.2 | Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Stationary use at weatherprotected locations. |
| ETS 300 019-1-4 Class 4.1 | Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Stationary use at non-weatherprotected locations – extended. |
| ETS 300 019-1-4 Class 4.1E | Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Stationary use at non-weatherprotected locations. Enhanced. |
| ETS 300 385 | Radio equipment and systems (RES); ElectroMagnetic Compatibility (EMC) standard for digital radiolinks and ancillary equipment with data rates around 2 Mbit/s and above |
| EN 55022 | Limits and methods of measurement of radio interference characteristics of information technology equipment |
| EN 60801-2 | Electromagnetic compatibility for industrial-process measurement and control equipment – Part 2: Electrostatic discharge requirements |
| ENV 50140 | Electromagnetic compatibility – Basic immunity standard – Radiated, radio frequency electromagnetic field; Immunity test |
| ENV 50141 | Electromagnetic compatibility – Basic immunity standard – Conducted disturbances induced by radio frequency fields |
| ENV 50142 | Electromagnetic compatibility – Basic immunity standard – Surge immunity test |
| IEC 801-4 | Electromagnetic compatibility for industrial-process measurement and control equipment – Part 4: Electrical fast transient – burst requirements |

———

 NTC C33512003SE_C0

# Glossary

## Abbreviations

| | |
|---|---|
| **2M** | 2 Mbit/s |
| **AGC** | Automatic Gain Control |
| **AIS** | Alarm Indication Signal |
| **BBE** | Background Block Error |
| **BER** | Bit Error Ratio |
| **BNC** | Bayonet-lock coaxial connector |
| **BQ** | Bayonet-lock 4-pin coaxial connector |
| **BSC** | Base Station Controller |
| **BTS** | Base Transceiver Station |
| **CEPT** | Conference Européenne des Administrations des Postes et des Télécommunications |
| **C/I** | Carrier to Interference Ratio |
| **CPU** | Central Processing Unit |
| **DC** | Direct Current |
| **DDD** | Doubly Differential Detection |
| **EMC** | Electromagnetic Compatibility |
| **ES** | Errored Seconds |
| **ETSI** | European Telecommunications Standards Institute |
| **EXU** | Expansion Unit |
| **FB** | Flexbus |
| **FBP** | Flexbus Plug-in Unit |
| **FC** | Fault Code |
| **FC RRI** | Integrated radio interface unit for Nokia MetroSite |
| **FE** | Functional Entity |
| **FEC** | Forward Error Correction |
| **FIU 19** | 19" Indoor Unit |

| | |
|---|---|
| **FXC RRI** | Integrated radio interface unit with enhanced capabilities for Nokia MetroSite |
| **GND** | Ground |
| **IC** | Interface Circuit |
| **ID** | Identification |
| **IF** | Interface |
| **ITU–R** | International Telecommunication Union – Radiocommunication Assembly (former CCIR) |
| **ITU-T** | International Telecommunication Union – Telecommunication Standardization Sector (former CCITT) |
| **IU** | Indoor Unit |
| **LED** | Light-Emitting Diode |
| **LMP** | Local Management Port |
| **MP** | Measurement Point |
| **MSC** | Mobile Switching Centre |
| **MSK** | Minimum-shift Keying |
| **nc** | Not connected |
| **NE** | Network Element |
| **NMS** | Network Management System |
| **NRZ** | Non-Return-to-Zero |
| **OU** | Outdoor Unit |
| **PC** | Personal Computer |
| **PDH** | Plesiochronous Digital Hierarchy |
| **PMR** | Professional Mobile Radio |
| **PRBS** | Pseudo–Random Binary Sequence |
| **PWR** | Power Supply Connector / power switch |
| **Q1** | Nokia's proprietary management interface (= V.11) |
| **RBER** | Residual Bit Error Ratio |
| **RD** | Received Data |
| **RF** | Radio Frequency |
| **RRI** | Radio Relay Interface |
| **RRIC** | Integrated radio interface unit for Nokia Talk family base stations |
| **Rx** | Receiver |
| **SB** | Supervision Block |
| **SDH** | Synchronous Digital Hierarchy |
| **SES** | Severely Errored Seconds |
| **SMB** | Coaxial connector type |
| **Sync** | Synchronisation |
| **TD** | Transmitted Data |
| **TDD** | Time Division Duplex |
| **TNC** | Threaded coaxial connector |

 NTC C33512003SE_C0

| | |
|---|---|
| **TQ** | Threaded 4-pin connector |
| **TRX** | Transceiver |
| **Tx** | Transmitter |
| **U** | Unit of height, 44.45 mm |

———

NTC C33512003SE_C0